

D. Cruigie,
With the Compliments
of the Author.

STATISTICAL AND PATHOLOGICAL REPORT

OF THE

ROYAL INFIRMARY OF EDINBURGH,

FOR THE YEARS 1833, 34, 35, 36, AND HALF OF 1837.

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DISPENSARY, &c.

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No. I. *Phthisis Pulmonalis.*

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To the Editor of the *Edin. Med. and Surg. Journal*,
SIR,—You are aware that the Managers of the Royal Infirmary,
wards the close of the year 1832, appointed an additional clerk,
nder the name of Pathological Clerk, whose duty it should be to
erform all the *post mortem* examinations,—to draw out a parti-
ular account of the morbid appearances,—and to insert them in a
ournal kept for the purpose, called the Register of Dissections,
long with a short history of each case, extracted from the daily
ournals.

The number of cases in the Register now amounts to nearly
500. I have thought that the result of a *statistical analysis* of
so many fatal cases, principally in reference to their pathology,
but also in regard to some circumstances of the diseases previous
to death, might be advantageously communicated to the profes-
sion through the medium of your widely circulated Journal. I
shall add some remarks which the great opportunities of the above
office have led me to make, since I was appointed to it in Octo-
ber 1833.

As the cases of *phthisis pulmonalis* are most numerous, amounting to 100, I shall consider them first, and have arranged them in a tabular form, which I drew out at first for my own convenience, but have been recommended to publish, as it will constitute a general view of the whole facts, from which every one may draw his own inferences. The numerous blanks in the Table in general arise from the examination being confined in several instances to the cavity of the chest, and even to the lungs, owing to the limited permission granted by friends ; or in the case of unclaimed bodies, to the other organs being preserved entire for the anatomical schools. I am, &c.

JOHN HOME.

29, York Place, October 30.

I shall follow nearly the order of the Table now given, and, in considering the results afforded by it, I shall arrange them under two general divisions. The first embraces the following circumstances in the history and progress of the disease during life ; I. Sex, II. Age, III. Occupation, IV. Duration of the disease, V. The influence of Season, VI. Comparative frequency and Mortality, and, VII. Peculiarities presented by some of the symptoms. In the second division shall be considered the pathology of the disease under the following heads. I. The degree and frequency of the affection of the larynx and trachea ; II. The nature and extent of the affection of the organs of the chest ; and, III. The nature and extent of the affection of the abdominal organs.

DIVISION I.

I. *Sex*.—From the foregoing table it appears, that of the 100 cases of *phthisis pulmonalis*, 61 were males, and 39 females. On consulting the general weekly list of patients, the same predominance of the disease in males over females is found. From the beginning of 1833 to the end of June 1837, the period which this report embraces, there were admitted into the Hospital, labouring under phthisis, 185 males, and 112 females, whereas the total number of admissions during the same period was, of males, 4512 ; of females, 4749. This shows that the greater prevalence of the disease among males is not owing to their being admitted in greater numbers into the Hospital, for the case is exactly the reverse. Nor can it be entirely owing to the natural predominance of the male sex over the female in point of numbers, as Dr Clarke has supposed, the proportion being in our cases 10 males to little more than 6 females, whereas the relative number of the sexes is, according to him, 10 males to 8 or 9 females. Besides the cause assigned by Dr Clarke, it most probably arises from men being much more exposed than women to those causes that induce the disease, viz. to the inelemency of the seasons, to the inhalation of various irritating particles, dissipation, &c. The foregoing

results differ widely from those given in a table by Dr Clarke in his excellent work, * especially those taken from the Parisian Hospitals, where the disease is more prevalent among females than males by about one-fifth.

II. *Age.*—The following Table shows the Ages of 96 of the cases, and how those are distributed between the two sexes.

<i>Ages.</i>		<i>Males.</i>	<i>Females.</i>	<i>Total.</i>	
Below 20,	-	6	5	11	
20 and under 30,	-	16	15	31	
30	40,	-	21	8	29
40	50,	-	8	9	17
50	60,	-	4	1	5
60	70,	-	2	0	2
70	80,	-	1	0	1
		—	—	—	
Total,	-	58	38	96	

It will be seen by the above table, that the greatest number of deaths occurred between the ages of 20 and 30, the next in proportion between 30 and 40, and the next between 40 and 50. The mortality above 50, and that below 20, is much less, being 8 for the first period, and 11 for the latter. These results agree remarkably with those arrived at by Dr Clarke, † from the numerous statistical tables he has examined. From the review of the above table it would appear that phthisis in this country prevails most between the ages of 20 and 40 inclusive, which period comprises 66 of the cases. Hippocrates ‡ fixed the period of its greatest prevalence between 18 and 35. This appears too early an age for the above cases. Only 3 of them were between 18 and 20: 18 were between 35 and 40. The opinion of Andral, that phthisis is more common among females below the age of 20, does not seem to be confirmed by the above table. Only 5 of the females died below that age. The larger proportion of them died after that age. It is remarkable that more females than males died between the age of 40 and 50, owing probably to the particular change in the female constitution at this period. Andral also found the mortality among women considerable at this period.

III. *Occupation.*—The following is a list of those whose occupations were known.

5 Masons	2 Jewellers	1 Ballad-singer.
4 Painters	2 Porters	1 Printer
3 Sailors	2 Servants	1 Labourer
3 Carpenters	1 Baker	1 Groom
3 Hawkers	1 Wheel-wright	1 Cutler
1 Writer	1 Tailor	1 Flax-dresser
1 Image-maker	1 Shoemaker	1 Iron-founder
1 Brass-founder	1 Bookbinder	1 Bookseller
1 Slater	1 Washerwoman	

Masons form the most numerous class in the above list. Besides being much exposed to the vicissitudes of the weather, and engaged in a trade which renders them liable to the inhalation of

* On Consumption, p. 183.

† Op. cit. p. 179

‡ Coac. progn. 439.

minute particles of various kinds, both siliceous and calcareous, they are in general much addicted to the use of spirituous liquors, by which they induce that cachectic state of the system favourable to the development of tubercles. It is probably for the same reason that painters are liable to the disease. Their occupation also is an unhealthy one, as it exposes them to the inhalation of noxious particles.

IV. *Duration.*—The following table shows the duration of the disease in 87 of the cases, and how far this is influenced by sex and age.

Duration.	Male.	Rem.	Tot.	Age.
14 days,	1	0	1	58
16	1	0	1	38
3 weeks,	1	1	2	40 m. 27 f.
4	0	1	1	37
5	0	1	1	26
6	1	1	2	40 m. 40 f.
7	1	0	1	22
2 months,	1	0	1	31
2½	1	0	1	39
3	4	2	6	30, 70, 64, 52 m. 32, 32 f.
3½	0	1	1	58
4	5	5	10	17, 22, 30, 36 m. 9, 9, 23, 27, of 2 not known.
5	4	4	8	18, 24, 28, 40 m. 17, 22, 24, 48 f.
6	4	2	6	4, 23, 31, 32 m. 32, 43 f.
7	2	3	5	21, 52 m. 21, 33, 36 f.
8	1	1	2	37 m. 24 f.
9	1	0	1	36
10	1	0	1	25
11	1	0	1	23
12	2	4	6	34, 36 m. 8, 21, 40, 45 f.
14	2	1	3	30, 35 m. 22 f.
15	1	1	2	27 m. 14 f.
18	2	0	2	23, 28
2 years,	3	1	4	4, 39, 46 m. 29 f.
2½	1	0	1	53
3	6	0	6	6, 28, 30, 31, 46, age of 1 not known.
4½	1	1	2	63 m. 49 f.
5	1	0	1	33
Several years,	5	3	8	21, 23, 30, 34, 42 m. 28, 29, age of 1 not known
Total,	54	33	87	

From the above table, it may be observed that 49 of the cases, or considerably more than one-half, die within eight months of the commencement of the disease ; and that of these 38, or about three-fourths, die between the third and eighth month. Dr Clarke* has come to nearly the same conclusions, from the examination of the cases of Bayle and Louis.

As to the influence of sex in the duration of this disease, the foregoing table shows that 27 of the males, or one-half, die in the first eight months, and that 22, or two-thirds, of the females die within the same period ; from which it appears that its duration is much shorter in the female than in the male sex. Louis † also found

* Op. cit. 165.

† *Recherches sur la Phthisie*, p. 186. Paris.

that the mortality among the females was much greater within the first year than among the males.

The above table also shows that age has little effect on the duration of phthisis ; for it will be seen from it, that after the different periods of duration, it proved fatal to persons of very various ages. Nor is it found that the acute cases were more common in young persons, as Louis was led to conclude from his experience. On the contrary, most of those in whom it proved fatal after a very short duration were considerably advanced in years.

V. Season.—The following table has been constructed from the general lists of the Infirmary, from the beginning of 1833 to the end of 1836, to show how the admissions and deaths in phthisis are distributed over the different months of the year.

<i>Months.</i>	<i>Admissions.</i>	<i>Deaths.</i>	<i>Months.</i>	<i>Admissions.</i>	<i>Deaths.</i>
January,	24	13	July,	23	22
February,	17	15	August,	26	13
March,	19	12	September,	21	9
April,	20	6	October,	25	11
May,	21	12	November,	24	13
June,	30	14	December,	30	14

It appears from the above that most admissions of persons labouring under this disease take place in December and June, the months of midwinter and midsummer, a coincidence which was not to be expected. But it is more remarkable that by far the greater number of deaths occur in July, one of the mildest months in this climate. Taking the three summer months together, it will be found that more deaths take place in these months than during any of the other seasons. The greater number of Bayle's cases also died during summer. And in Glasgow, according to the mortality bill of 1836, this season is also the most fatal for phthisical patients. The cases from these three places have been arranged together in the following table, according to the seasons of the year in which they proved fatal.

<i>Season.</i>	<i>Paris.</i>	<i>Edinburgh.</i>	<i>Glasgow.</i>	<i>Total.</i>
Winter,	58	40	318	416
Spring,	54	33	333	420
Summer,	68	48	361	477
Autumn,	64	33	304	401
	<hr/> 244	<hr/> 154	<hr/> 1316	<hr/> 1714

I apprehend that we can explain satisfactorily this increased mortality in the summer months, when we reflect that the greater number of cases commence in the winter and early spring months ; that being prolonged into the summer they arrive at that period in the duration of the disease in which most deaths occur, viz. between the third and eighth month. Comparatively few, therefore, survive this season. The exhausting heats, also, may have the effect of increasing the hectic symptoms, and thus may hurry on the fatal termination. I state this with great deference to Dr Clarke, who, from

the examination of the London bills of mortality by Dr Heberden, adopts the common opinion, that the winter months prove most fatal to phthisical patients. I am inclined, however, to think that in these tables many chronic affections of the chest, attended with emaciation, such as chronic pleurisies, chronic bronchitis, and emphysema, were included under the head of consumption, —the diagnosis of that disease not having arrived in the days of Dr Heberden at the degree of perfection it has attained since the time of Laennec.

VI. Comparative frequency and mortality.—In order to show these, I have extracted from the general lists the number of admissions and deaths in phthisis, continued fever, and in all diseases,* and arranged them in the following table.

Diseases.	Admissions.			Deaths.		
	Males.	Females.	Total.	Males.	Females.	Total.
Phthisis pulmonalis,	185	112	297	89	81	170
Continued fever,	1652	1961	3613	271	215	486
All diseases,	4512	4749	9261	688	563	1251

The frequency of phthisis in the Infirmary may be estimated by comparing the number of phthisical patients admitted with the total number admitted labouring under all diseases. It is found to amount to one phthisical case for every 31 and a fraction patients admitted, in other words, it forms about one-thirtieth part of the whole admissions. Continued fever, on the other hand, forms somewhat less than the half of the whole admissions.

On comparing the deaths in phthisis with the number of admissions in the same disease, we find that they stand in the relation of 1 to 1.7; the deaths in fever to the admissions in fever, as 1 to 7.4; and the whole number of deaths to the whole number of admissions, also as 1 to 7.4, so that in phthisis one patient nearly in every one and a-half admitted dies, whereas in fever and all other diseases, one only dies in every seven and a-half. In the case of fever, this may be reckoned as the proportion of the deaths to the recoveries, whereas in phthisis it can be only reckoned as the relation of the deaths to those that are dismissed.

It appears that more women die of phthisis in proportion to those admitted than men, which may be accounted for by the disease proving sooner fatal in the one sex than in the other; or perhaps it may be owing to the stay of women in hospital being more prolonged than that of men. On the contrary, in fever, and in all diseases, the mortality among the men is greater than among the women, although more of the latter are admitted than of the former.

As to the mortality in phthisis in comparison with the general mortality, it is found that it is as 1 to 7.35, in other

* The surgical diseases are not included.

words, it forms a little less than one-seventh* of the whole mortality. The relation of the mortality in fever to the general mortality is as 1 to 2.5, or somewhat less than one-half of the whole mortality. It is to be remembered that the above results are to be considered only as applicable to phthisis as it occurs in the Royal Infirmary, not to the disease generally. Many patients labouring under the disease never apply for admission, and several of those applying for admission are rejected, especially when there are numerous applications by patients labouring under more curable diseases. On the contrary, the greater number of fever cases that occur in the town are sent to the hospital, and none are ever rejected. The above results, therefore, if applied to these two diseases generally, would give a very unjust preponderance to the frequency and mortality of fever over those of phthisis.

VII. Symptoms.—The symptoms of *phthisis pulmonalis* are now so well known, and detailed at such length by systematic authors, that an account of them need not detain us long in a report of this kind, which treats principally of the pathology of the disease. Some symptoms, depending upon particular lesions, will be more properly considered after detailing these. It may only here be mentioned, that what have been called in the table *usual symptoms*, viz. cough, dyspnoea, night-sweats, emaciation, &c. occurred in the greater number of cases.

Hæmoptysis is mentioned as having occurred in 26 of the cases. In the greater number of these it was in small quantity, and only occasionally. In 4 only was it in considerable quantity; in 2 of these, in all probability, it arose from the erosion of large vessels, which had remained unobliterated.

Affection of the Stomach, denoted by pain in the epigastrium, nausea, vomiting, occurred in 10 of the cases. In 3 of these the stomach seemed to be the organ primarily affected, the affection of the lungs being secondary to it. In the others the stomach was affected simultaneously with, or subsequently to, the organs of the chest.

Dropsical symptoms were observed in 6. It will afterwards be seen whether these were connected invariably with affection of the heart, as some suppose. Palpitations occurred in 4. In 1 these were connected with disease of the heart.

DIVISION II.

We shall now pass on to the more particular object of this paper,—the pathology of the disease.

The organs of the head were examined in a few cases only, and in all of these were found healthy.

* This is very different from the experience of M. Louis, Op. cit. p. 187, who calculated that one-half the patients in La Charité died phthisical.

I. LARYNX AND TRACHEA.—According to the general tabular view of the whole 100 cases, ulceration of the larynx was found in 5 only ; but as these organs were seldom examined, except when symptoms referable to them occurred during life, the relative proportion of those in which they were sound to those in which they were found diseased cannot be ascertained. I am confident, however, that these organs are much less seldom affected in this country than in France, where M. Louis* found them affected in one-fourth of his cases, and Andral † in three-fourths. In nearly all the cases the ulcers were of small extent, and superficial, occupying chiefly the interior of the *epiglottis*, parts about the *rima glottidis*, *chordæ vocales*, &c. In one case the *epiglottis* had been partly destroyed by the ulceration. There was generally at the same time slight thickening of the neighbouring parts, accompanied occasionally with the deposition of a yellow matter, apparently, into the submucous tissue. The trachea was less seldom affected than the larynx, being found ulcerated in one of the cases only, in which perforation of all the coats between two of the rings had taken place. I believe with M. Louis, that such ulcerations of the larynx and trachea are peculiar to phthisis, never having found them in the examination of patients who had died of other diseases, except in syphilis, in which disease, however, the ulcers are much deeper, and attended with much more thickening of the surrounding tissues. In some of the cases, instead of ulceration, a redness of the membrane lining these organs was the only lesion found, not confined to either side, as mentioned by Louis, but generally in detached patches, or diffused over a large space. In none of the cases was any thing like round hard tubercles detected, as described by Andral and others.

These lesions of the larynx and trachea gave rise in all the cases to prominent symptoms ; to a cough of a peculiar character ; to hoarseness, amounting in some to aphonia ; to pain about the larynx, &c. In one case, in which most of these symptoms were well-marked, the larynx and trachea were found quite sound.

II. THE NATURE AND EXTENT OF THE AFFECTIONS OF THE ORGANS OF THE CHEST—1. *The Lungs.*

A. Tuberculosis.—This, which has been considered since the time of Laennec the essential lesion in *phthisis pulmonalis*, occurred in all the cases. The tubercular matter assumes two very different forms in the lungs, the one a hard, almost cartilaginous semitransparent substance, varying in colour from light-gray to perfect black, to which Laennec, and afterwards Louis, † gave the name of *gray semitransparent matter* ; the other, a light-yellow opaque substance, of variable consistence, sometimes nearly as hard as cartilage ; at other times soft and friable, like some kinds

* Op. cit. p. 48.

† Clin. Med. Vol. iii. p. 191.

‡ Op. cit. p. 3.

of cheese, which the above pathologists called *Crude Tuberclé*. They supposed that these two varieties of tubercular matter were closely allied to one another; that the gray semitransparent matter, in beginning to soften, necessarily passed into the yellow,—a process which, according to them, commenced in the centre of each mass; and that the yellow matter was never deposited primarily without passing through the previous stage of grayness and semitransparency. Many recent pathologists, however, are now of opinion that these two forms of tubercular matter, though frequently found associated, and the one even springing up in the centre of the other, yet for the most part are independent of one another. Laennec* himself, from the following passage, seems to have been quite aware that cases do occur where the yellow matter is found without any trace of the gray: “The conversion of the gray and gelatinous infiltration into yellow tuberculous matter is sometimes so rapid, that in examining lungs containing large masses of the latter (yellow,) we sometimes find no trace of the former (gray,) although there can be no doubt that the one originated in the other.” He was, however, so wedded to his favourite theory of the conversion of the one into the other, that he endeavoured to account for the absence of the gray matter by its rapid conversion into the yellow. It will afterwards be seen, that a similar yellow tubercular deposit was found in several of the cases, without any of the gray matter being anywhere visible; that in all of them the symptoms during life indicated that an acute action had been going on in the lungs; and that its presence in these organs was always associated with appearances known to be the result of inflammation.

It appears to me that both these varieties of tubercular matter are generally the result of inflammatory action; and that the great difference between them consists in the yellow being the result of an inflammatory action, acute at the commencement, but very liable, in some constitutions, to degenerate into a chronic form; whereas the gray semitransparent matter is the result of an inflammatory action, which is chronic from the beginning.

Tubercular matter, whichever of these two forms it assumes, it may now be concluded, from the labours of recent pathologists, among whom the name of Dr Carswell † stands pre-eminent, is situated, for the most part, in the air-cells, and in the smaller branches of the bronchi. On this idea, I think it may be called, 1. Simple Tuberclé, when situated in single air-cells; 2. Aggregate Tuberclé, when deposited in several contiguous air-cells, or the whole of those constituting a lobule; and, 3. Diffused Tuberclulation, when occupying several contiguous lobules, a whole lobe, or an

* On Diseases of the Chest, Forbes' Translation, p. 277,

† Cyclopaedia of Med., Art. Tuberclé.

entire lung. Each of these may be subdivided into the *gray* or the *yellow*, as they consist of the one or the other of the varieties of tubercular matter.

This division of tubercles, by substituting a cell of the cellular texture for air-cell, may be equally adopted by those who suppose them to be situated, not in the air-cells, but in the cellular tissue, of the lung, and is much the same as that of M. Gendrin, who was of the latter opinion.

a. SIMPLE TUBERCLE.—Corresponding to the *miliary tubercle* of Laennec, to the *simple tubercle* of Lombard, and to the *disseminated tubercle* of Gendrin. Of this there are two varieties, the gray and the yellow.

a. Gray Simple Tubercle, corresponding to the *miliary granulations* of Bayle,* and to the *gray granulations* of Laennec and Louis. They formed the principal lesion in five of the cases, (No. 112, 139, 206, 242, and 419.) In all their appearance corresponded accurately to the description of them given by Laennec.† They were more generally diffused over the lungs than some of the other forms of tubercle; but were more abundant, and more crowded together in the upper lobes, where also they began first to undergo ulterior changes. In two of the cases the left lung was more occupied by them than the right; in the other three both lungs had them in nearly equal quantity. The ages of those in whom they occurred were the following, 22, 23, 31, 37, and 39, so that they are more common in adult age. One only was a female, the other four were men.

Pathologists differ in their opinion as to the nature of this kind of tubercle. Bayle, who was the first to describe them, considered them to differ entirely in their nature from common tubercles; that they approached more to the nature of accidental cartilages; and that they constituted a peculiar species of phthisis under the name of *phthisie granuleuse*. M. Laennec and Louis thought they formed the primitive stage, or nascent form of the common crude tubercle. Broussais ‡ took them for enlarged lymphatic glands, while more lately Andral § has ascribed their origin to acute inflammation of individual vesicles, constituting in their early stages small red soft tumours. That they may have their origin in this *acute* form, cannot be denied, as it rests on such great authority; but I apprehend that in this country this mode of their formation is extremely rare. Although I have carefully examined the lungs of upwards of 500 individuals, yet I have never met with the appearance described by Andral. On the contrary, granulations in

* *Recherches sur la Phthisie*, p. 26. Paris, 1810. † *Op. cit. p. 273.*

‡ *Sur les Phlegm. Chron.*

§ *Op. cit. p. 11.*

their hard semitransparent state are far from being an uncommon appearance in the lungs, even of those who have not manifested any phthisical symptoms during life. These simple gray tubercles appear to me to be the result rather of a chronic inflammation of the individual air-cells, giving rise to the effusion of a concrete lymph on their lining membranes, which, gradually accumulating from the circumference to the centre, at last fills the whole of their cavities. Occasionally their central portions remain empty, producing the appearance of central depressions, when these tubercles are divided. At other times they contain in their centres a kind of inspissated mucus, giving rise to the appearance, as Dr Carswell * has observed, of central softening, so much insisted on by Laennec. More rarely these tubercles contain in their centre bodies derived from without, as grains of sand. A remarkable case of this kind was exhibited some time ago to the Anatomical Society by Dr J. Y. Simpson, occurring in a stone-mason, both of whose lungs were extensively studded with hard dark gray miliary tubercles. Each of these on being divided contained in its centre a minute earthly particle, which on examination was found to consist of silica and carbonate of lime. These particles had no doubt been inhaled from without, had lodged in the several air-cells, and given rise to a chronic inflammation of their lining membrane, followed by the effusion of a concrete lymph, which had gradually included in its substance the offending body. † These tubercles, being the result of a slow process, may exist in considerable quantity in the lungs without giving rise to any symptoms. The surrounding pulmonary tissue is then generally in a healthy condition, or the air-cells have become dilated, by which they are enabled to perform a kind of supplementary respiration. In this state the chest affords a clear sound on percussion, and a puerile respiration is heard by the stethoscope. In all those cases where urgent phthisical symptoms had preceded death, the intervening pulmonary tissue was much loaded with frothy and bloody serum, or it was much condensed, and of a bright salmon-red colour. This morbid action going on in the surrounding tissue, caused no doubt by the irritation of the tubercles, is the principal cause, I apprehend, of the very urgent dyspnoea and fever which occur in these cases. The same thing happens in other organs of the body. Tumours of the brain, the result of a chronic process, often remain in a similar latent state, till at last they suddenly give rise to serous effusion into the surrounding substance of the

* Cyclop. of Med. Art. Tubercl.

† Since writing the above, I have been informed that a portion of the same lungs was exhibited to the Medical Section of the British Association, lately assembled at Liverpool, by the late Dr Mackintosh, who threw additional light on the nature of these particles by stating, that their composition was exactly the same as had previously been found by Dr Gregory to be that of the stone of the Craigleith Quarry, in which the man laboured as a quarryman.

brain, or into the ventricles, and thus cause sudden, and often urgent cerebral symptoms. Tumours on the serous membranes, the result of chronic inflammation, occasionally give rise also to sudden effusions of serum into the cavities lined by them. Most of the above five cases, which have been given as examples of miliary tubercles, had lasted for some time previous to the coming on of the urgent symptoms. The tubercles were in all probability formed during this period. In the interesting case of the lad cited by Dr Alison * in his excellent paper on the formation of Tubercles, it is probable, that the tubercles were formed during the attack for which he was first brought into the hospital. From this he recovered, went out and exposed himself to cold, and was readmitted with urgent symptoms, caused in all probability by the morbid action going on in the pulmonary tissue surrounding the tubercles, which we are told was of a redder colour than usual, much loaded with serum, and in parts condensed.

The diagnosis of this kind of tubercles during life is allowed by Louis and Dr Clarke to be very difficult. Percussion generally causes a dull sound if the pulmonary tissue is much condensed or loaded with serum. It often, however, retains so much air from the previous dilated state of the air-cells, that little dulness of sound is produced by percussion. The stethoscope generally indicates the existence of different râles from the accompanying bronchitis. I have noticed in two of the cases a very peculiar modification of the crepitous râle, much resembling the breaking of Russia leather, occurring principally during expiration. I was so struck with it in the case of Stewart (112,) that when I again heard it in the case of Crawfurd (242,) I was led to give the diagnosis, which I did, to Dr Craigie, that miliary tubercles would be found diffused through the lungs, along with engorgement of the surrounding pulmonary tissue. I conceive this râle to be produced in the same way as the crepitous râle, so satisfactorily explained by Dr Williams, modified by the different nature of the fluid contained in the bronchial tubes.

C. Yellow Simple Tubercle, called by Laennec *Crude Miliary Tubercle*.—These are more rarely diffused singly over the lungs than the gray variety. More commonly they are associated in groups. They are, however, occasionally seen disseminated through the lungs of children who have died of pectoral affections, following some of the febrile exanthemata, as small-pox and measles, the surrounding lung being generally in the state of red hepatization. I have seen them also in the lungs of adults, affected with pneumonia which had reached the third stage or that of suppuration. They are distinguished in this situation from the surrounding parts by their bright yellow colour; and they have generally a

* *Medico-Chirurgical Transactions*. Vol. iii. part i. p. 287.

soft consistence. It was this species of tubercle that was commonly produced in the lungs of rabbits into which mercury had been injected by Cruveilhier,* Dr Kay,† and others. Each tubercle contained in its centre a minute globule of mercury, to the irritation of which it no doubt owed its origin. Laennec considered that the yellow tubercle always originated in the gray, by a yellow point commencing in their centre, and "that the only difference between them was that which exists between a ripe and a green fruit." It is possible that the gray substance may occasionally form a nidus for the deposition of the yellow, but that the latter always originates in the former cannot now be maintained. As the gray tubercles are in all probability the result of a chronic irritation of individual air-cells, so are the yellow the effect of a more acute irritation. When recent they are generally associated with appearances, which are the acknowledged results of inflammation. When they have been deposited for some time, these tubercles, like the yellow tubercular matter in general, become harder from compression or from absorption of their fluid parts, and the surrounding pulmonary tissue often regains its healthy condition.

*b. AGGREGATE TUBERCLE.—the Multiple Tuberclé of Lombard—Agglomerated Tuberclé of Gendrin.‡—*Laennec and Louis have no distinct appellation for them, except it be *groups* of tubercles or *tubercular masses*. They are formed by the filling up of several contiguous air-cells, or the whole of those constituting a lobule with tubercular matter. They vary much in size, from that of peas to that of walnuts. Like the simple tubercle, they may be subdivided into the gray, and the yellow aggregate tubercle.

a. The Gray Aggregate Tuberclé varies much in size and shape, according as few or many of the air-cells of a lobule are filled with tubercular matter. Like the gray granulations they are very hard, generally semitransparent, and vary in colour from a light-gray to nearly black. The different portions of the same aggregate tubercle often exhibit those various shades of colour, according as the several simple tubercles of which it is composed are more or less tinged with the black pulmonary matter. When attentively examined, we can sometimes distinguish the different simple tubercles of which they are composed, each of them with a depression in its centre, or a yellowish point. Occasionally they contain in their substance siliceous particles, which occurred in one of the cases in the table (412), a mason. Generally, however, their structure is so homogeneous that the separate tubercles of which

* Nouv. Bibl. Med. September 1826.

† Ed. Med. Chir. Trans. Vol. iii. p. i. p. 300.

‡ Essai sur les Tuberclé. Paris, 1827.

they are composed, cannot be distinguished even on the most attentive examination. They give in most cases a crenated form to the circumference of each aggregate tubercle. I apprehend that they have an exactly similar origin to the simple gray tubercles or miliary granulations.

β. Yellow Aggregate Tuberclē.—Those, like the former, vary much in size and shape. When recently deposited, as we occasionally see them, in the lungs of children after acute inflammation, following the febrile exanthemata, they often assume a star-like form, or an arborecent appearance, arising from the tubercular matter having filled a few only of the terminal branches of a bronchial tube. This arrangement is well seen in Dr Carswell's plates.* When the whole cells of a lobule are filled with this yellow tubercular matter, the aggregate mass assumes the shape of the lobule in which it is formed. This is seldom at first round, but angular and lozenge shaped. The round form, I believe, of these tubercles is afterwards assumed when they have been for some time deposited, and is owing to the pressure being equal on all sides. This has the effect also of making their texture, which was at first soft and friable, hard and compact. I conceive them to arise from acute inflammation of the lining membranes of several contiguous air-cells, or those of a whole lobule. When soft and recently deposited, they are generally associated with other known effects of inflammation, such as red hepatization of the surrounding pulmonary tissue, lymph on the neighbouring pleura, which, as observed by Dr Alison,† in all respects resembles the matter effused into the substance of the lung. But if they should be found, as occasionally they are, in their soft recent state, without their being accompanied with any marks of surrounding inflammation, I do not consider this as an argument against their having had an inflammatory origin. Lobular peripneumonies are often seen surrounded by perfectly healthy tissue. In the same way we can conceive the inflammation giving rise to these tubercles, limited to the single lobules in which they are formed. There is a great analogy between this kind of tubercle when recent and lobular peripneumonies; indeed it appears to me the only difference is, that the latter go on more rapidly to suppuration forming abscess. I have had numerous opportunities of witnessing them in the lungs of those who have died after capital operations. They are often mistaken by surgeons for tubercles, and are supposed to have existed previous to the operation. I agree with M. Blandin‡ in thinking that they are the only source of the purulent deposits that so often take place in the lungs after operations.

Aggregate tubercles of both kinds being formed by the filling up of several or of the whole air-cells of a lobule by tubercular

* *Fascic. i. pl. I. fig. 1.* † *Ed. Med. Chirurg. Trans. Vol. i. 1824, p. 410.*
‡ *Journal Hebdomadaire.*

matter, necessarily include within their substance the parenchymatous structure of the lung, consisting of the parietes of the air-cells, the intervesicular cellular tissue, and the blood-vessels which ramify between and on the membrane of the air-cells. The two first structures may often be seen, on attentive examination of the section of one of these tubercles, much thickened, and associated with masses of black pulmonary matter. The blood-vessels are generally soon obliterated by the pressure of the tubercular matter, so that they are very seldom seen carrying red blood. When observed, as they have been lately by my friend, Dr Kingston,* I apprehend they afford no proof of the organization of tubercular matter.

c, DIFFUSE TUBERCLE, OR DIFFUSED TUBERCULATION OF THE LUNG, otherwise called by Laennec, Louis, Gendrin, &c. *Tubercular Infiltration*, is formed when several contiguous lobules, a whole lobe, or a whole lung are occupied by the tubercular matter. Like the others it consists of two varieties.

α. *The gray Diffused Tuberculation* corresponds to the *gray tubercular infiltration* of Laennec,† to the *chronic peripneumony* of Andral.‡ When of a very dark-gray colour, Bayle§ mistook it for melanosis, and thought it constituted a distinct species of phthisis, to which he gave the name of *phthisie avec melanose*. Like the two other kinds of the gray semitransparent tubercle, it varies in its shade of colour from a very light gray to nearly perfect black, arising from its being more or less tinged with the black pulmonary matter. These shades of colour are often so variously intermixed with one another, that the general mass assumes a very variegated colour, resembling some kinds of gray marble.|| Its texture is very homogeneous, and generally cuts like cartilage. The thickened interlobular septa may occasionally be seen traversing the hardened mass in various directions; and even the separate air-cells filled with the gray semitransparent matter are sometimes observed. ¶ The gray diffused tuberculation, I believe, with Dr Williams,** to consist of the same matter as the miliary granulations, only diffused over a large space. Like these also I conceive it arises from a chronic inflammation of the air-cells widely diffused. It occasionally exists alone, unassociated with any of the yellow tubercular deposition. More commonly, however, the latter is diffused in points and masses through it. In some cases this may arise from a subsequent process of irritation going on in the gray semitransparent matter, which is the opinion of Dr Williams. I am more inclined to ascribe their origin to a subsequent acute action going on in some of the air-cells and lobules, which have escaped being filled up by the gray mat-

* Lond. Med. Chirurg. Trans. 1836.

† Op. cit. p. 270.

‡ Clin. Med. Vol. iii. p. 230.

§ Op. cit. p. 28.

|| Vid. Hope's Plates, fig. 47.

¶ Vid. Carswell's Plates, fig. 47.

** On Diseases of Chest, 1835, p. 130.

ter, the result of a more chronic action. The smaller points may arise from the process of softening commencing in the centre of the individual tubercles. This kind of tubercular disease is found at all ages, but more commonly in those advanced in years, and in them also it is less associated with the yellow tubercular deposition.

β. The yellow diffused Tuberculosis, corresponding to the *yellow tubercular infiltration* of Laennec, Louis, and Andral. I presume it is to this kind of tuberculosis to which Dr Graves gives the name of *scrofulous pneumonia*. Dr Carswell, without giving it a distinct appellation, compares it to *boiled liver*. It forms the first two varieties of phthisis in the division of Dr Stokes. When it has assumed a chronic form, and gone on to ulceration, it forms the *phthisis a peripneumonia* of Morton. It occurred in ten of the cases, (Nos. 190, 212, 332, 385, 399, 421, 464, 529, 547, and 552.) The lung occupied by this kind of tubercular deposit, when recent, is of a light yellow colour, dense, but at the same time friable. It is very granular on the cut surface indeed when broken up it seems entirely composed of little granular bodies, set close together, compared by Laennec to the eggs of certain insects closely compacted. These grains are evidently the air-cells filled with the yellow matter. A lung in this state is often, I believe, thought to be in the third or gray stage of peripneumonia, from their similarity in appearance, and from symptoms very like those of pneumonia having preceded death. The tubercular, however, may be distinguished from the pneumonic affection, by being of a light yellow colour, sometimes approaching to white, much more granular on the cut surface, and in not yielding a drop of fluid on the strongest pressure. When it has been deposited for some time, it loses its bright yellow colour, becomes harder, and assumes a darker colour, from being more tinged with the black pulmonary matter. In this stage it very much answers the description of the chronic peripneumonia of Laennec,* which, he says, occasionally is to be met with around tubercular excavations. When we have an opportunity of examining this kind of tubercular matter in the act of deposition it will be seen to be deposited in detached patches in a portion of lung already in the state of red hepatization. These patches assume the lozenge-shaped form of the lobules, and as these lobules become successively invaded by the yellow matter, the patches begin to approximate each other, at last coalesce, and thus a large portion of lung becomes, in the language of Laennec, infiltrated with this tubercular matter. Laennec, † from the following passage, seems to have been quite aware of this mode of its deposition. When treating of the yellow tubercular infiltration, he says, "This form is

* Op. cit. p. 233. † Op. cit. p. 277.

found in different points of the lungs, in masses of a yellowish-white colour, much paler, duller, and less distinct from the substance of the lungs than the common crude tubercles. These masses are *irregular*, *angular*, and never have the nearly round shape of ordinary tubercles." But I believe Dr Hope to be the first that accurately pointed out this mode of its deposition by lobules, and has admirably illustrated it in his plates, to which I refer the reader.* It appears to me that it is always deposited in this way, and though in general, when occupying a large space, it loses the lobular form, yet it occasionally retains it, a good example of which is given in Dr Carswell's plates, † where the interlobular partitions are seen dividing the tubercular deposit into angular portions.

This kind of tuberculation occurred in persons of all ages, from eighteen to fifty-eight. It is not peculiar to those of a *tuberculous* constitution. Besides those examples of it given in the table, it occurred in many persons above middle age, who had long laboured under chronic affections of the chest, as chronic bronchitis, and aneurisms of the aorta, in whom it seemed to have supervened shortly before death, and to have been the immediate cause of the fatal termination. Acute symptoms of more or less intensity, resembling those of pneumonia, occurred before death in all the cases. In one (421) the duration was only fourteen days, in another (464) sixteen days. In (212) the urgent symptoms lasted only three weeks. In the others, though they had laboured under pectoral symptoms for some time, yet these became more urgent previous to death. The pulse in all was considerably above 100, and the dyspnoea very great. Crepitous rale is mentioned as having been heard in two. The appearances on dissection were very similar to those found in general, as the effect of inflammation of the lung. In some of the cases parts of the lung were infiltrated with serum; in all but two, the pulmonary tissue between the tubercular deposits was found in the state of red hepatization; in five yellow lymph, very similar to the matter constituting the tubercular deposit, as noticed by Dr Alison, ‡ covered the *pleura pulmonalis*, generally without serum, as in *pleuro-pneumonia*, in one case associated with effusion of serum. Another circumstance, strikingly in proof of the analogy of these cases with pneumonia, is the more frequent affection of the right lung. In three it was alone affected, in four it was more affected than the left, in two they were equally affected, in one only was the left lung more affected than the right. §

* Vid. fig. 17, 21, 23. † Fig. 1, pl. 3. ‡ Ed. Med. Chir. Trans. 1824. p. 410.

§ It differs from pneumonia, however, in more frequently affecting the upper lobes. Of the ten cases, in four the lower lobes were alone affected, in three the upper, in one

From all these circumstances, I think there can be no doubt, that this yellow diffused tuberculation is the effect of acute inflammatory action going on in the lungs. Indeed, this is not denied by Dr Clarke,* who otherwise is a great opponent of the inflammatory origin of tubercles. If we ascribe this origin to the diffused form of the yellow tuberculation, we must allow that the same matter, when confined to single lobules, or to single air-cells, has a similar origin. What, then, it may be asked, is the difference between pneumonia and acute tuberculation of the lungs, since they both consist in inflammation? I conceive that they differ in their seat. Common pneumonia, I think, is seated not in the air-cells of the lungs, as many seem to suppose, but in the cellular tissue intervening between them, and in that separating the lobules; and that it is very analogous to diffuse inflammation of the cellular tissue in other parts. Like diffuse inflammation pneumonia attacks in general the most depending portions first, hence the lower lobes are first affected in those who are in the erect position on the invasion of the disease, and the posterior parts of the lung, in those who are in the recumbent position, as in the pneumonia supervening at the latter stages of fever, or in the pneumonia of the dying. Like it, pneumonia commences with oedema and ends in suppuration, which has a tendency to diffuse itself, and seldom or never ends in abscess. Like the diffuse inflammation of the cellular tissue, too, pneumonia is † attended with a symptomatic fever, very analogous to the common continued fever, and which in worn-out subjects is very apt to assume a typhoid type. The yellow tuberculation of the lung, on the other hand, is situated in the air-cells and smaller branches of the *bronchi*, from its having actually been seen in this situation by Carswell, Reynaud, and others, from its granular form, (when examined attentively the grains are seen to hang from branch-like pedicles,) resembling much the disposition of the cauliflower, and, lastly, from its being deposited in the lobular form, which is the case when blood is effused into the air-cells, as in pulmonary apoplexy. It is probably the effect of acute inflammation of their lining membrane. This, from the arguments adduced by Dr Harrison‡ and others of the Dublin school, we have every reason to believe, is of the nature of a serous membrane; hence when inflamed it pours forth the same products as serous membranes, yellow lymph and serum. The latter probably escapes

the middle, and in two it extended to all the lobes. On the contrary, of ten cases of pneumonia recorded in the register, in eight it was confined to the lower lobes, in one to the upper and middle, and in one it extended over all the lobes. Hence, I am inclined to believe that most of the cases in which pneumonia is said to have affected the upper lobes were examples of this acute yellow diffused tuberculation.

* Op. cit. p. 46.

† Practice of Physic, by Bright and Addison, Part ii. p. 233.

‡ Dublin Med. Journ. May 1837, p. 233.

with the halitus, and the plastic lymph is alone left behind. In healthy subjects, in whom the disease does not prove fatal in the acute stage, this lymph is most likely either absorbed, or, becoming organized, is gradually converted into a tissue analogous to that in which it is generated, and may give rise to cohesion of the opposite surfaces of the tubes and air-cells, causing their obliteration, as in the cases which, according to Dr Stokes,* occurred to M. Reynaud. In debilitated or scrofulous subjects, on the other hand, in consequence of the debility of the absorbing or assimulatory functions, it is not absorbed, nor does it become organized, but it degenerates into a chronic state, and may be gradually converted into tubercular matter, which acts as a foreign body, and a process is set up for its elimination. In the same manner acute pleurisy in such habits often degenerates into empyema. Chronic inflammation of the same serous lining gives rise, instead of the yellow, to the gray semitransparent matter, just as it does in cases of pleurisies which have been chronic from the commencement. In them it is usually deposited in the form of layers, but it occasionally assumes the form of granulations, which, notwithstanding the opinion of Chomel and Andral, it appears to me, are quite analogous to the gray granulations found in the substance of the lung. The *gelatinous infiltration* of Laennec is also the result of a chronic inflammation of this lining membrane of the air-cells and smaller *bronchi*. It is a rare affection of the lungs in this country. It did not occur in any of the cases. I saw it once covering the pleuræ with a layer of considerable thickness in a case of chronic pleurisy associated with purulent matter.

On the supposition that both kinds of tubercular deposit arise from inflammation, either acute or chronic, of the air-cells and the smaller branches of the *bronchi*, we can account for their so often being the consequence of *bronchitis*, especially when long-continued, it being merely an extension of the inflammatory action from the larger tubes to their smaller branches. We may also account for the deposition first taking place in the upper lobes and in the posterior parts of these lobes, from the *bronchi* being shortest at this part. The inflammation, in spreading along these tubes, here first reaches the small branches and the air-cells. To this may contribute the more frequent occurrence, according to Andral, of *bronchitis* in the upper lobes.

Although the inflammation of the cellular tissue of the lung constituting pneumonia, and that of the air-cells and smaller *bronchi*, giving rise to tubercular deposits, occur generally independent of one another, yet they are not unfrequently conjoined. In the midst of a mass of lung in the suppurative or third stage of pneu-

monia, small round light yellow bodies are occasionally seen of a soft consistence, rarely hard. These are simple tubercles, having their origin in acute inflammation of single air-cells. They were noticed by Gendrin, * who assigned their true seat, but denied that they were tubercles, from their being soft, yellow, and opaque. He also placed the seat of pneumonia outside the air-cells. I believe them to be of contemporaneous origin with the pneumonia. Pneumonia is more seldom seen associated with the aggregate form of tubercle, (although Laennec † mentions having met with yellow tubercular masses of the size of filberts in the centre of a portion of lung already advanced to the state of purulent infiltration,) and very rarely with the diffused form. I never saw a case of it. The case of a peculiar species of pneumonia described by Dr Stokes, ‡ I believe to be one of the kind. The bunches of granules in the above case, I conceive, were the air-vesicles filled with the tubercular plastic matter, rendered more distinct by the suppuration which had taken place in the cellular texture around them. In cases of common pneumonia advanced to the suppurative stage, such granules are never seen, as the air-cells are empty, and have suffered compression from the surrounding purulent matter.

B. EXCAVATIONS.—These were formerly considered, under the name of *vomicæ*, to be essential to the existence of phthisis. It is now allowed, however, that it may prove fatal without them. They were not found in eight of our cases. Three of these were examples of the *phthisie granuleuse* of Bayle, in which the *gray simple tubercle* is the essential lesion; three were examples of the diffused form of the yellow tubercular deposition: and in the remaining two the *diffused gray tuberculation* formed the principal lesion, associated with limited portions of the yellow matter.

Pathologists are not agreed as to the part of the tubercle in which the process of softening commences. Laennec and Louis supposed it always to commence in the centre of each tubercle. Lombard and Carswell indifferently in the centre, and at the circumference. I believe that it differs somewhat in the different kinds of tubercle. In the simple or miliary tubercle it generally commences in the centre, which in most cases remains empty, and into which a quantity of mucus or serum is poured from the corresponding bronchial tube. This has the effect of breaking up the tubercle from the centre to the circumference, and the softened matter escapes into the bronchial tube. The cavities to which they give rise are of small size, not larger than peas, and are sometimes

* *Histoire Anat. des Inflamm.* Vol. i. p. 313. † Laennec, *Op. cit.* p. 291.

‡ *Op. cit.* p. 143.

found, like the tubercles, scattered over the lungs, of which Dr Baillie * saw cases. I have seen similar cavities scattered over the lung proceeding from the softening of gray simple tubercles, the outer parts of many remaining in their hard state, and inclosing the softened portion. More commonly, however, they are confined to the upper lobes, and from the tubercles having there previously coalesced, they give rise to larger cavities. In the *aggregate* tubercles the softening may commence at any part of their substance, according as it takes place in the several simple tubercles of which they are composed, being effected partly by the central softening of each, and partly by the inclosed cellular tissue pouring out a purulent fluid. In these aggregate tubercles, when they have attained a hard consistence, the softening may also commence at the circumference. The interlobular cellular tissue, which surrounds these tubercles, being compressed and irritated by them, pours out a purulent fluid, which has the effect of breaking down the circumference of the mass, the central portion being at first either left isolated in the centre of the cavity, or adhering by a narrow pedicle to one side of it. When the tubercular matter is entirely softened, the walls of the cavity, which in these tubercles are constituted generally by the interlobular cellular tissue, continue to secrete a purulent fluid. Cavities formed by the softening of those aggregate tubercles never exceed the size of walnuts. Lobular peripneumonies, which differ from common pneumonia in being seated in the air-cells, and the smaller branches of the *bronchi*, in suppurating, also give rise to abscesses, which are limited by the interlobular partitions. As the *diffused* tuberculation is formed by the *juxta*-position of the aggregate tubercles, so its softening commences in each of these individually, giving rise to separate cavities,† which are sometimes dispersed over the whole of a lobe or two lobes, without having coalesced, when the lung may be well said to be riddled by them. They are lined by membranes constituted by the interlobular cellular tissue much compressed. In this the larger vessels of the lungs ramify. The compression‡ has served to obliterate these, and in this way hemorrhage is prevented when these partitions come to be ruptured. It occasionally happens that these vessels remain pervious, and, the ulcerative process attacking their coats, copious hemorrhage

* Morbid Anatomy.

† It appears to me that the destructive effects on the lung produced by the suppuration of these tubercular deposits is chiefly owing to their being confined to lobules by the interlobular cellular tissue. In pneumonia, on the other hand, the matter is diffused throughout a wide space, and, therefore, has not the same tendency to break up the pulmonary texture.

‡ The compression of these blood-vessels by the diffused tubercular deposition occasionally gives rise to gangrene of portions of the lung.

is apt to follow. This was the case in two instances, (99 and 348.) Copious haemoptysis occurred in both before death. On dissection vessels quite pervious were seen to cross the cavities; (see Plate I.) but in neither could the orifice from which the blood came be discovered. By the breaking of the partitions communications are formed between neighbouring cavities, and thus larger ones are formed, which occur generally at the upper and back part of the superior lobes. These are often crossed by transverse bands, the remains of the unbroken interlobular partitions containing generally obliterated vessels. These large cavities are generally very irregular in their size and shape. I have seen one occupy nearly the whole of a lung. They are seldom lined by a distinct membrane. Their walls are generally constituted by the surrounding condensed lung. A yellowish layer of lymph occasionally partially lines their interior.

With regard to the healing of these cavities, I agree with Dr Carswell* that "pathological anatomy has perhaps never afforded more conclusive evidence in proof of the curability of a disease than it has in that of tubercular phthisis." I differ, however, from him in his description of this curious process. I believe that tubercular matter is never converted at once into cretaceous matter, as he supposes sometimes to happen, without having previously been softened, been eliminated, and given rise to excavations. Cretaceous tubercles are always enveloped in a firm fibrous cyst, to one part of the circumference of which bronchial tubes may be traced, and a depression in the corresponding surface of the lung is always found. This is never the case with common tubercles. These cretaceous tubercles appear to me to be formed in the following manner. The walls of the excavation about to heal up, consisting of dense fibrous matter, gradually contract, along with the orifices of the bronchial tubes entering the excavation, with the walls of which they are continuous. This contraction having proceeded a certain way, the bronchial tubes become obliterated probably by thickening of their walls, and adhesion of their membranes. The walls of the cavity, which has now assumed a round or oval form, continue to secrete a purulent fluid. This, unable to escape, remains in the cavity; its more liquid parts become absorbed, to which the pressure of the still contracting walls contribute. It passes successively through various degrees of consistence, from that of thick cream to that of hard dry putty. It now constitutes the cretaceous tubercle, surrounded by a firm enveloping cyst, at one side of which the obliterated bronchial tubes terminate. The obliteration occasionally extends for some way along the tubes, more commonly it takes place suddenly at the part where the bronchial tube reaches the enveloping cyst;

* Cyclopaedia of Med. Vol. iv. p. 267.

and the rest of its canal remains previous, or has become dilated. The corresponding depression of the surface of the lung is caused by the falling in of the subjacent pulmonary tissue, which has been forced to follow the contracting cavity. These cretaceous tubercles* undergo still farther changes in being converted into hard calcareous matter. I have met with one mass in the lungs of the size of a nut, firmly enveloped in a fibrous cyst, in which obliterated bronchial tubes terminated. In general these calcareous masses do not exceed the size of peas; they often retire from their enveloping cysts, and are occasionally seen loose in the cavities,† from which they may afterwards escape, and be found in the expectoration. I believe the above to be the general way in which the healing of tubercular cavities takes place. I have never met with cicatrices, as formed by the adhesion of opposite surfaces of a cavity, or empty cavities lined by a serous membrane, and secreting a serous fluid, described by Laennec and others.

C. **UNTUBERCULATED PULMONARY TISSUE.**—It sometimes retained its natural character; more commonly it was altered. In some cases the air-cells had become dilated, or had acquired a state of hypertrophy, by which they were enabled to perform a kind of supplementary respiration, and thus to make up in some measure for the portion of lung rendered unfit to carry on this function. The lung had acquired that state in some of those cases where a copious deposit of miliary tubercles had taken place over a considerable extent of one or both lungs, rendering percussion nugatory in their detection. In other cases, where the upper lobes had become condensed, the lower lobes exhibited this condition; and, lastly, it was often well marked in the sound lung, when the other had been rendered unfit for respiration. I have seen the sound lung acquire this condition to such a degree, that it pushed the anterior *mediastinum* to the opposite side, and thus encroached on the opposite lung. It is a very analogous state to emphysema, and is often mistaken for it. This latter also is sometimes found associated with tubercular deposits, especially of the chronic kind; indeed, two of the most exquisite cases of emphysema, attended with large bullæ, that I have seen, occurred under these circumstances. The tissue of the lung unoccupied

* Since writing the above, I have read the excellent memoir of M. Reynaud on Obliteration of the *Bronchi*, in the fourth volume of the *Memoirs de l'Academie de Medecine*. In this he treats at considerable length of those cretaceous tubercles, and takes a similar view of their formation to that in the text. He says he has observed them to contain within their substance bronchial tubes, and portions of formerly organized tissue. I have never observed this; but when they do occur, they appear to me to be the remains of these bands containing bronchial tubes and obliterated vessels, which are often found crossing from one wall of cavities to the other, and which have been included within the mass of the cretaceous tubercle.—When they exist they will aid materially the contraction of the cavity, by drawing the opposite walls together.

† Vide Dr Hope's Plate 1, fig. 24, 27, 29.

by the tubercular matter was occasionally much infiltrated with serum. It occurred in eight of the cases ; and in several of these between the miliary tubercles. When associated with much reddening and softening of the tissue, it might be said to constitute the first stage of pneumonia. The red hepatization occurred in several of the cases, especially those in which the yellow acute tuberculation took place. In these it generally assumed a very granular appearance. When it occupied the pulmonary tissue, between the miliary tubercles, or had attacked the lower lobes shortly before death, the lung assumed a very tough consistence, was very smooth on the cut surface, and the appearance seemed to be produced by adhesion of the opposite surfaces of the air-cells, without the intervention of any other substance, and was very analogous to what has been called *carnification* of the lung. This, I presume, is the non-granular form of the red hepatization described by Williams.

D. PLEURÆ.—*a. Adhesions* of opposite surfaces of the pleuræ existed in all the cases, generally on both sides, always in one or other of them. Of those cases where they were confined to one lung, the right side was more frequently affected than the left, which differs from the experience of M. Louis,* as he found them more common on the left side than on the right. Their extent was always proportionate to the tubercular state of the lungs, and their strength and thickness to the progress of the excavations. They were most extensive and intimate at the upper and back part of the lungs. The medium of union was in some a layer, varying in thickness from a few lines to one-fourth of an inch, of a gray semitransparent matter, of various shades, much resembling the matter of gray tubercle, and like it occasionally assuming the granular form. In other cases a yellow layer, of variable consistence, in all respects analogous to the yellow tubercular matter, formed the bond of union. Occasionally these two substances were associated. In a few rare instances the opposite pleuræ adhered without the intervention of any other substance. In 16 of the cases, evidences of *acute pleurisy* were found : in 4 of these a yellow lymph was alone effused, slightly glueing together the opposite surfaces of the pleuræ. In all the others it was conjoined with the effusion of serum. In 6 it was the result of perforation of the pleuræ, in which case air was most generally effused at the same time. In 2 the matter effused was more like the fluid of empycema, approaching the nature of pus. In 9 of the cases serum was effused into the pleural cavities, in one of which it was bloody. In one (209) something like gangrene of the pleuræ had taken place.

* Op. cit. p. 39.

b. Perforation of the pleuræ occurred in six of the cases, in (256, 261, 262, 359, 361, and 403;) three were on the right side, and three on the left. Louis, on the contrary, found them more common on the left side, in the proportion of 7 to 1. They were in all situated either in the lower part of the upper lobe, or in the upper part of the one below it, generally more anteriorly than posteriorly. Most of them seemed to arise from the thin walls of a cavity, which had approached the surface without previous adhesion, giving way. In one or two cases they were caused by the adhesions themselves breaking up these thin parietes, in the manner ingeniously pointed out by Dr Carswell.* The shape of the orifice was in some round or oval, in others irregular and ragged. In most of the cases the perforation gave rise to acute inflammation of pleuræ, (See Plate II.) marked by sudden pain and dyspnoea: In one death took place in a few hours, in another after two days. In others, as in No. (256,) the perforation had existed for some time, and the accompanying pleurisy had degenerated into a chronic state. In this case a large ulcerated surface existed on the anterior part of the upper lobe of the right lung, in the centre of which was an opening leading to deeper seated cavities. The thin external walls of the cavity in which perforation had taken place had been removed by ulceration, exposing the internal walls, which then formed the surface of the ulcer. Through the central orifice air was heard to pass freely during life, giving rise to loud amphoric respiration. In case (359,) both orifices seem to have become plugged up, preventing the air from longer entering the cavity of the pleuræ. The case then became one of common empyema. This happened still more remarkably in another case, which, having been put down in the register under the name of chronic pleurisy, is not inserted among the cases in the table. An account of it was published in this Journal by Dr Henderson,† who gave a perfectly correct diagnosis of the case before death. Obliteration of the orifice seemed to be effected partly by its valvular nature,‡ which the pressure of the accumulating fluid would have the effect of closing, and partly also by the thick pultaceous matter that had been deposited around it from the pleuritic fluid. An exactly similar case is given in the first volume of the Liverpool Medical Journal. This conversion of pneumothorax, with effusion into simple empyema, by the shutting up of the fistulous orifice, is an effort of nature to cure the disease, which it is to be feared is too often prevented by the unnecessary interference of the surgeon, for the operation of paracentesis in cases of empyema of this nature, I con-

* Dr Clarke on Consumption, p. 154. † Ed. Med. Surg. Journ. Vol. xlvi. p. 346.

‡ The valvular structure of the orifice is well described by Dr Houghton in the Cyclopædia of Practical Medicine, Art. Pneumothorax.

ceive, always must hurry the fatal termination, by removing as it were the pressure from the valve, and thus readmitting the air through the orifice. Death in both the cases soon followed the operation.

E. BRONCHI.—These were more or less inflamed in nearly all the cases ; indeed, so commonly were they affected, that little notice is taken of it in the account of the dissections, which will account for the frequent blanks in the column of the table headed bronchitis. Few cases of phthisis occur which do not commence with bronchitis. I have endeavoured to account why the one so frequently should follow the other, and why therefore the tubercular matter should be first deposited in the upper and back parts of the lungs. The bronchi entering excavations were often much reddened and inflamed, probably from the irritation of the contents of the cavities passing over them, as remarked by M. Louis.* In addition to inflammatory redness, the bronchial membrane was occasionally found thickened, but rarely ulcerated. When this did occur, as in one or two of the cases, their situation was about the bifurcation of the trachea. In one or two cases the bronchi were dilated.

F. RELATIVE AFFECTION OF THE TWO LUNGS.—In 25 of the 100 cases both lungs were equally affected. In 38 the right lung was most affected : In 37 the left. From these results it would appear that the two lungs were nearly equally affected. The same conclusion is confirmed by the cases of perforation, 3 of which were on the right side, and 3 on the left. If any difference existed in the frequency of the affection of the two lungs, it was rather in favour of the right, as of 5 cases in which one lung only was affected, four were on the right, and only one on the left. Louis,† in his cases found the left lung much more frequently affected than the right ; and Laennec,‡ on the other hand, found the right the more frequently affected. So that the result of our cases holds a sort of middle course between the experience of these two pathologists.

2. HEART.—Out of 66 cases in which the state of the heart was examined, it was healthy in 40, or in about two-thirds. This is very different from the experience of Andral §, who found this organ healthy in one-third and diseased in two-thirds. In 4 the left ventricle was hypertrophied, in 1 the right, and 5 the hypertrophy extended, as it most commonly does, to both ventricles. In most of them it was evidently caused by disease in the aortic, or most generally in the mitral valves. The state of the lungs had little effect in producing the hypertrophy, otherwise the right ventricle would have been more frequently affected than the left. Louis|| also found the right ventricle less seldom affected than the

* Op. cit. p. 37.

§ Clin. Med. Vol. iii. p. 271.

† Ibid. p. 8.

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‡ Op. citat. p. 282.

|| Ibid. p. 53.

left, as it occurred in one case only out of 112, whereas the left was affected in 6 cases. The mitral valves were diseased in 4, the aortic in 1; giving rise in all to hypertrophy of one or both cavities. The left ventricle was dilated in its cavities, and thinned in its parietes in two cases. The *foramen ovale* was open in 3 cases. Adhesions of the heart to the pericardium existed in 1 case. Serum was effused to a considerable extent within the pericardium in 1 case. General dropsy occurred in 2 only of the cases in which the heart was found diseased, and in 3 of those which had dropsical symptoms the heart was found perfectly healthy. These facts seem to show that general dropsy is not always owing, as some suppose, to disease of the heart. In some cases this is undoubtedly its origin. In other cases it may be owing to the impeded circulation through the lungs, to the altered state of the blood, or to the general debility of the system.

III.—NATURE AND EXTENT OF THE AFFECTIONS OF THE ABDOMINAL ORGANS.

1. STOMACH.—Of 36 cases in which this organ was examined it was found healthy in 19, or nearly in one-half. In one case it was very much contracted: in 7 cases it was, on the contrary, much distended, so as in some to fill nearly the whole cavity of the abdomen, concealing the other viscera, and extending downwards as far as the brim of the pelvis. Its position also in such cases was generally altered. Instead of being situated across, it lay lengthwise from above downwards, the pyloric end being dragged down into the right iliac region. This great distension of the stomach is certainly peculiar to phthisis, as M. Louis * remarked, being seldom or never observed in other diseases. It is generally accompanied with much paleness of the whole organ, with thinning of the whole coats sometimes to an extreme degree, and occasionally with softening of all of them. Louis ascribed it to the effect of the concussion of the cough on the coats of the stomach. This may be the cause of it in some cases. But as it is not found in cases of other pectoral affections accompanied with a cough as severe and as long continued as in phthisis, I would rather ascribe its origin to debility of the coats of the stomach attending the dyspepsia that so often accompanies phthisis, from which they yield to the accumulation of air within the cavity of the organ. The mucous membrane was softened in five of the cases, in some extending over the whole internal surface, most generally confined to the portion lining the cardiae extremity. The characters of this softening corresponded accurately to the excellent description given of them by M. Louis. It was known at once by the large dark vessels which traversed the softened portion. † The cause of their increased size appears to me to be

* Op. cit. p. 62.

† Vide Hope's Plates, Fig. 132.

owing not so much to their being more distended by blood, as to that blood which they contain transuding through their coats, and tinging the softened mucous membrane for some distance on each side of their tract. The blood, too, acquires a very dark colour, probably from the gases of the stomach acting more readily on it through the softened membrane. This increased imbibing power consequent on the softening of the membrane is shown also by its being tinged yellow from the bile, while the unsoftened portions retain their natural colour. I have remarked this softening more frequently in those who have died of phthisis than of other diseases. I believe it is often the cause of the severe dyspeptic symptoms which often attend that disease. In some cases it is no doubt a *post mortem* change. The mucous membrane was thickened and mammillated in one case; it was extensively reddened in two cases. Ulcerations were found in two; in one case in the pyloric end, in the other in the small curvature.

2. The SMALL INTESTINES were examined in 66 cases, and were found healthy in 20. In 13 the solitary and agminated glands of the mucous membrane lining the lower portion of the ileum were found enlarged. Connected with these glands, small hard tumours, generally of a tubercular nature, of a gray or yellow colour, as they happened to consist of the gray or yellow tubercular matter, were often found. When in connection with the solitary glands, the tumours were isolated, but when the agminated glands were invaded by them they occurred in groups. The ulcers often seemed to originate in the subsequent softening and ulceration of these tubercles. Ulcerations were found in 30 of the cases, in one-half nearly. Louis* found them in a much larger proportion in his cases, in 78 out of 112. I have nothing to add to the minute description given of them by Louis and Andral.

3. The LARGE INTESTINES were examined in 55 of the cases. They were found ulcerated in 38, a proportion considerably greater than the small intestines. M. Louis, † on the contrary, found the small intestines more frequently ulcerated than the large. They generally occupied a greater extent of the membrane than in the small intestines, and extended to a greater depth. In one case (296) the ulceration had proceeded through the whole coats, giving rise to acute fatal peritonitis. Tubercular matter was seldom seen in the mucous membrane of the large intestines.

In case (560,) in which dysenteric symptoms took place towards the close of the disease, the mucous membrane of the whole of large intestines, and the lower part of the small intestines, was found reddened and roughened from the deposition of recent lymph on its surface.

4. The MESENTERIC GLANDS were found enlarged in 8 of the

* Op. cit. p. 84.

† Op. cit. p. 101.

cases. What relation these bear to those in which they were healthy is not known, as the number of cases in which they were examined is not mentioned. They were much less seldom found diseased than might have been supposed, from the frequent occurrence of ulcerations. The substance of the glands when enlarged was generally red, softened, and contained numerous yellow points which, gradually coalescing, the whole gland was converted into tubercular matter. This in some went rapidly on to suppuration, in others slowly. The pus was collected in an abscess, the walls of which were formed by the thickened enveloping capsule of the gland. The contained matter by absorption of its liquid parts seemed sometimes to be converted into a matter like putty, which afterwards became hard and calcareous. They were reduced to this latter state in one of the cases. This mode of cure in these glands is exactly similar to the healing up of tubercular cavities. Three of the cases in which these glands were found affected occurred in children, in whom they produced symptoms of *tabes mesenterica*, masking in a great measure the phthisical. In adults they produced no symptoms. A lardaceous tumour existed in the folds of the mesentery in one case.

5. The LIVER was very commonly diseased in the cases. Out of 65 cases in which it was examined it was found healthy in 14 only. In 23 it exhibited different forms of the early stages of *cirrhosis*, in which the organ becomes enlarged, hardened, and variegated in colour like a section of the nutmeg, with dark red spots scattered over a light yellow ground. The cellular tissue was occasionally thickened and indurated, as well as the peritoneal covering, which had contracted adhesion in some with the lower surface of the diaphragm. In none of the cases had it attained the advanced stage of that disease, when it becomes lobulated and diminished in size. In many cases this disease of the liver was no doubt owing to obstructed circulation through, and diminished function of, the lungs; but I would ascribe its origin in most of the cases to the abuse of spirituous liquors, to which many of the individuals in whom it was found were addicted; hence we may account for its more frequent occurrence among men than among women. Neither Louis nor Andral take notice of such an affection of the liver in their cases. They mention the *fatty* state of the liver as having occurred in one-third of their cases. It occurred in a smaller proportion in our cases, in 10 out of 65. Its characters corresponded very exactly with the description of it given by M. Louis.* The colour was a light reddish-yellow, or salmon colour, dotted over with brownish-red irregular spots; its consistence was soft, and the organ had a very unctuous feel. It occurred more fre-

* Louis, op. citat, p. 115. Andral, op. cit. p. 346.

quently in women than men, in the proportion of 9 to 1. Nothing is known of the origin of this particular change in the liver, nor in what it consists. In some of the cases it was combined with adhesions of the liver to the lower surface of the diaphragm, as if inflammation had some share in its production. Many of the individuals in whom it occurred were addicted to the abuse of intoxicating liquors. Another change of the liver, which I would denominate the *waxy liver*, has not been noticed by any author, except by Professor Mayo, under the name of *Steatosis*. The liver in this condition acquires an increased size, weighing from six up to fourteen pounds, in which last case it filled the whole abdomen; its capsule is generally thick and opaque; its internal substance dense, but friable, homogeneous, of a brownish yellow colour, much resembling bees-wax, with a strong resinous lustre, feels soapy to the touch, greases the knife with which it is cut, and communicates a greasy stain to paper by the aid of heat. In some of its characters it bears considerable analogy to the fatty degeneration, but it differs from it in the liver acquiring a larger size, in its colour being of a much darker hue, and perfectly homogeneous. It is probably an advanced stage of the same affection, being an extension of the matter composing the brown spots over the whole substance of the organ. It occurred in five cases, four of which were women, and one man. Its intimate nature and cause are alike unknown. The liver was enlarged in three cases, without being otherwise materially diseased. In three its colour was observed to be paler than usual, probably partaking of the general anaemia of the system. It contained tubercles in three.

6. The SPLEEN was thickened and opaque in its capsule in one case. In one case a piece of bone the size and shape of the patella was imbedded in its substance. It contained tubercles in its substance in two cases; in one of these they consisted both of the yellow and gray kind.

7. The KIDNEYS.—These organs were in general found healthy. In two cases they were paler than usual, in one of which the cortical portion was very dense. In four the structure of the organ had undergone the granular degeneration first described by Dr Bright, so that this particular change in the kidney is not incompatible with the tubercular diathesis, as its discoverer supposed. Tubercles were not found in the kidneys in any of the cases.

8. The PERITONEUM.—Serum was effused into the cavity of the peritoneum in three of the cases, in two of which it was associated with dropsical effusion in other parts of the body. Lymph and serum, the result of acute inflammation of the membrane, were found in this cavity in two; in the one it was general, and was the result of perforating ulcer of the colon; in the other it was more partial, being confined to the right iliac region.

The effects of a still more partial peritonitis were observed in the portions of the membrane opposite to the deep ulcerations of the ileum, by which their presence was often ascertained before opening the gut. In these portions the membrane loses its smooth glistening appearance, becomes rough and unequal, from being covered with small granules, some gray and semitransparent, others yellow and opaque, resembling the two kinds of simple or miliary tubercle so often mentioned. These were generally incircled with a red zone, composed of minutely injected vessels, showing the diseased appearance to consist in inflammation. The effect was evidently to thicken the membrane, so as to prevent its rupture, or to cause adhesion of two opposite folds of ileum, so that if rupture did take place the contents might not escape into the general cavity of the abdomen.

Explanation of the Plates.

PLATE I. Represents the section of upper lobe of left lung in Case 348, extensively affected with the acute form of the diffused tuberculation, degenerated into a chronic form, and displaying numerous excavations. One near the apex contained blood, and two vessels, under which a probe has been passed, are seen to cross from one wall to the other, the canals of which were quite pervious. The bronchial tubes entering cavities are much reddened.

PLATE II. Perforation of the pleurae followed by acute fatal pleurisy occurring in Case 361. A probe has been passed from the bronchial tube behind through the superficial cavity into the perforation, which was of an oval form, and situated about the middle of the upper lobe. The lung (the left) is much compressed, and covered with a thick coating of yellow lymph.











